



## Application User Guide

AUG 045 / Rev. 1.0

# Polling Data Registers from Allen-Bradley PLC

This short guide explains how to poll data registers from a Allen-Bradley





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## 1. Objective

The objective of this document is to explain how the Flexy device can poll data registers out of one or more PLCs.

Polling PLC data registers implies the following steps :

- Linking the Flexy device with the PLC
- Configuring the Flexy device IO Server
- Creating tags in the Flexy device
- Monitoring tags

**- Note -**

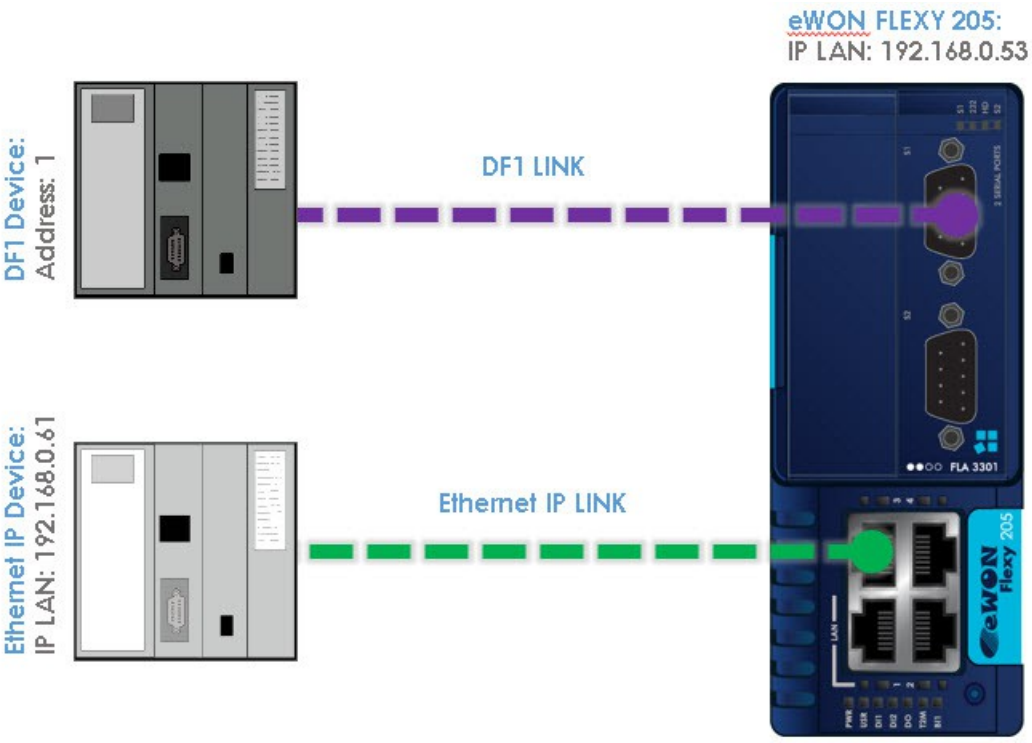
*Advanced explanations are indicated by this icon*



## 2. Hardware requirements

In order to follow this guide you'll need:

- A PC with an Ethernet Interface to connect to the Flexy device
- An Allen Bradley PLC (PLC5, SLC500, MicroLogix, CompactLogix, ControlLogix, FlexLogix)
- If DF1 protocol will be used to poll the data, then the extension card FLA 3301 2 Serial-Ports is required.





### 3. Software requirements

#### **eWON Flexy configuration software:**

The eWON Flexy is configured through its web interface. Which is accessible with any modern web browser as shown here below:

- Firefox 15+
- Chrome 16+
- Safari 6+
- Edge 13+
- IE 11

This tool allows you to list all the eWON Flexy devices on your network and execute changes such as IP address change, firmware upgrade or device recovery (if required).

#### **Firmware Version**

This guide targets eWON Flexy devices running a firmware version 12.2 or higher.

## 4. Protocol compatibility

The table below shows the protocols that are supported and configurable (IO Servers) in the eWON Flexy device to connect to Allen-Bradley PLC.

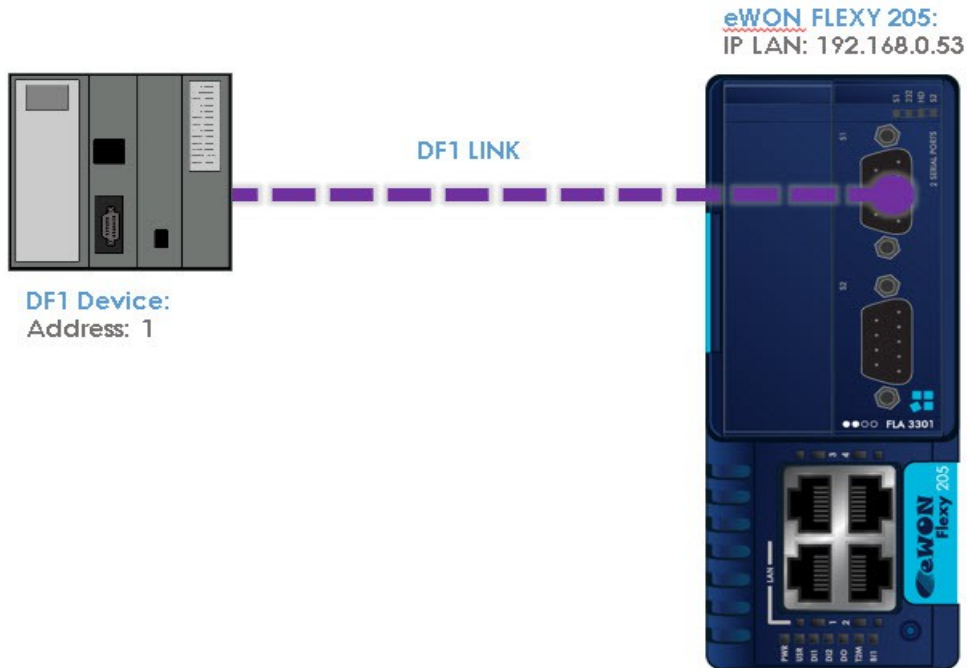
PLC-Family	DF1 protocol (RS232 link)	EIP protocol (Ethernet link)	IO Server name
SLC500	YES	YES	DF1
MicroLogix	YES	YES	DF1
PLC5	YES	YES	DF1
CompactLogix	YES	YES	ABLOGIX
ControlLogix	YES	YES	ABLOGIX
FlexLogix	YES	YES	ABLOGIX

**- Note -**

*The DF1 IO Server is not limited to DF1 protocol, it also handles the associated EIP protocol of the listed PLC families. Even though the eWON Flexy does not provide direct DH+ compatibility, an indirect connectivity can be established using a ControlLogix unit equipped with a DHRIO card as gateway. This feature allows the eWON Flexy to poll PLC tags located on a DH+ network. Polling is done using the Flexy EIP protocol.*

## 5. Linking the eWON Flexy and PLC

### Serial link configuration



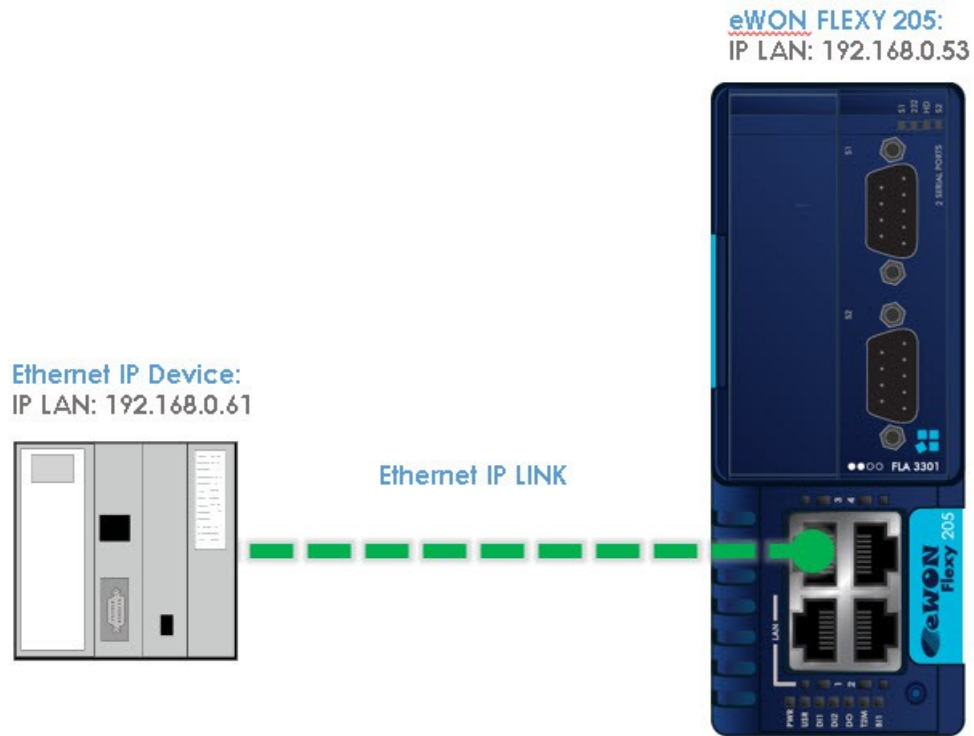
- Use the Allen Bradley DF1 crossed serial cable ref 1747-CP3 or equivalent to interconnect the eWON Flexy with the PLC.
- In case you are using the port S1, set the Dip switch of the Serial Extension card to RS232 mode (all ) to allow the DF1 communication with the PLC as shown in the graph below (The settings of the dip switch are indicated on the wire diagram of the Serial extension card).



**- Note -**

*In the PLC configuration, the Serial port must be configured in DF1 Full Duplex mode. This is the standard setting for the PLC interface while running maintenance program.*

#### Serial link configuration



- Link one of the LAN port of the eWON Flexy with the Ethernet card of the PLC and make sure the eWON Flexy LAN IP address is in the same range as the PLC IP address. Use the eBuddy tool to change the eWON Flexy LAN IP address if it is not within the same range as the PLC.



## 6. Configuring the IO Server

- Connect your PC to one of the LAN ports of the eWON Flexy
- Open the web browser and enter the IP address of the eWON Flexy
- Log into the eWON Flexy web interface
- Go to Tags menu on the left hand side
- Click on the IO Servers option and a supplementary menu will be displayed
- Select the IO Server DF1 for SLC500, MicroLogix and PLC5 devices
- Select the IO Server ABLogix for CompactLogix, ControlLogix and FlexLogix devices



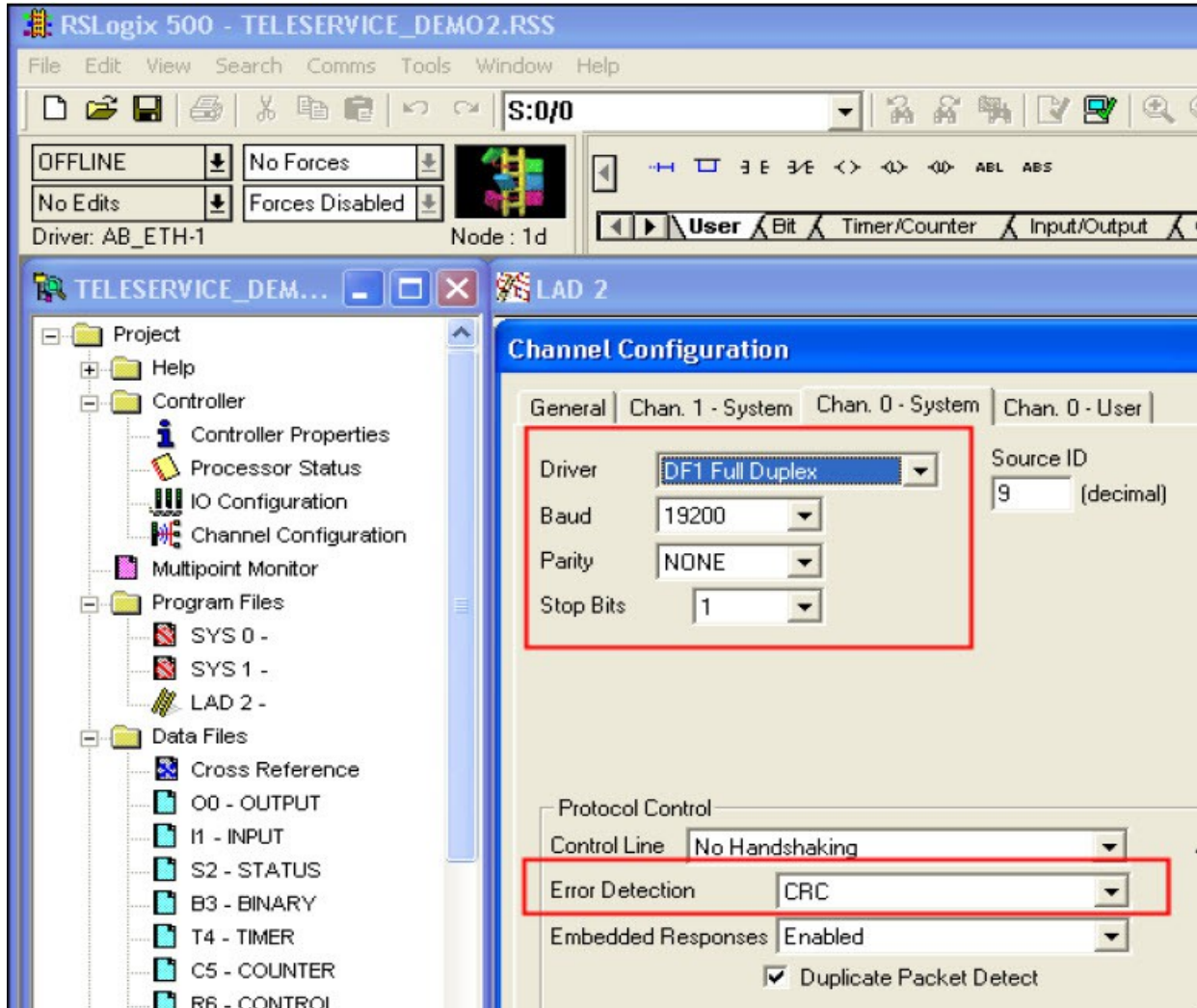
### Specific to Serial link

- Set the **Baud rate**, **Parity**, **Stop Bit** and **Frame Error detection** parameters as defined in the PLC.
- **HW Mode**, Select Full Duplex NO Handshaking
- Leave all other fields blank (default)

COM Setup

COM Port:	<input type="text" value="IO Port1 (COM:1)"/>	
Baud Rate:	<input type="text" value="19200"/>	Default 9600
Parity:	<input type="text" value="None"/>	Default: NO
Stop Bit(s):	<input type="text" value="1"/>	Default: 1
Frame Error Detection:	<input type="text" value="CRC"/>	Default: CRC
HW Mode:	<input type="text" value="Full Duplex NO Handshaking"/>	Default: Full Duplex
Master response timeout:	<input type="text"/> MS	20..60000, default: 1000
Rx message timeout:	<input type="text"/> MS	1000..60000, default 3000
Tx message timeout:	<input type="text"/> MS	1000..60000, default 3000
DF1 Address:	<input type="text"/>	Device address of eWON on DF1 link (0..254, default: 4)
Destination DF1 Address:	<input type="text"/>	Device address of destination on DF1 link when EIP is used (0..254, default: 1)

- On SLC500 PLC you can find the communication settings in the Channel Configuration window of your PLC project. As shown below:



- To be able to poll data registers out of your PLC, you need to enable at least one Topic. Topics are used to allocate common properties to a group of tags (properties include **Enable/Disable**, **Poll Rate** and **Global Device Address**).

**Topic A**  Enabled

Global Device Address:  Enter DF1 node or EIP connection path (IP address, followed by 1 or several (port,link) pairs).

Poll Rate:  MS Default: 2000

**Topic B**  Enabled

Global Device Address:  Enter PLC address.  
PLC address is made of on device type followed by a DF1 node or an EIP connection path address.  
Type may be omitted in that case the target device is assumed to be a SLC-500 like device.

[SLC500-] SLC500 device type

[PLC5-] PLC5 device type

Poll Rate:  Continue to: DF1 node or EIP connection path address Default: 2000

- **Enable** at least **Topic A** by ticking the appropriate box.
- Enter valid address in **Global Device Address** as per table below:

PLC Family	IO Server	Global Device Address
SLC500	DF1	1
MicroLogix	DF1	1
PLC5	DF1	PLC5-1
CompactLogix	ABLOGIX	1
ControlLogix	ABLOGIX	1
FlexLogix	ABLOGIX	1

- **Poll Rate**, defines the refresh rate in ms (milliseconds) applicable to all data registers that will be included in this this topic. If you have tags that need to be refreshed at a different rates, enable and configure multiple topics.
- Save your settings by clicking on **Update**.

**Specific to Ethernet link**

- If you communicate only with Ethernet-connected PLC(s) and do not use the serial link, then set the Baud rate to Disabled and leave all other parameters in the COM Setup part as default. If you use both type of communication simultaneously, keep your serial settings as described before.
- Enter valid address in Global Device Address as per table below:

PLC Family	IO Server name	Global Device Address	Syntax
SLC500	DF1	192.168.0.61	IP Address
MicroLogix	DF1	192.168.0.61	
PLC5	DF1	PLC5-192.168.0.61	Device type-IP Address
CompactLogix	ABLOGIX	192.168.0.61,1,0	IP Address, Port, Link
ControlLogix	ABLOGIX	192.168.0.61,1,0	
FlexLogix	ABLOGIX	192.168.0.61,1,0	

**Example:**

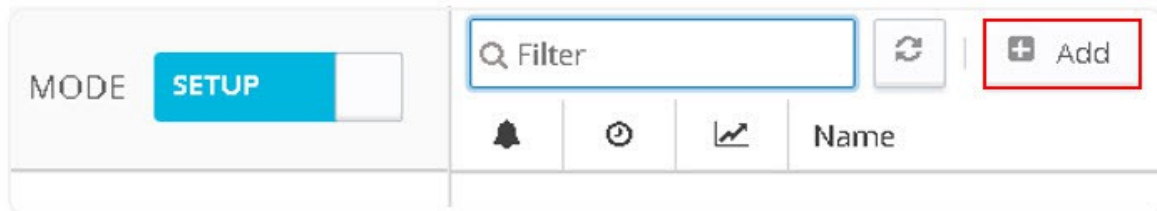
Basic syntax for ABLOGIX IO server : IP Address,1,CPU slot number (no spaces after commas).

**- Note -**

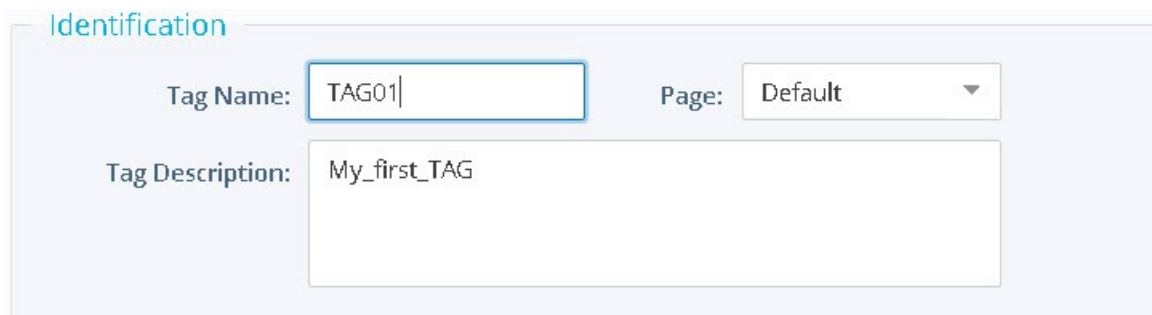
*The eWON Flexy can connect more than 3 PLC. In this case, the destination PLC is NOT specified in the Topic but in the Tag itself. For further information refer to the document KB-0113-00*

## 7. Creating tags in the eWON Flexy

- On the left hand menu, please select the option Value under the Tags menu
- Switch to Setup MODE
- Click on Add (+)



- Once the create a new Tag window opens, proceed to enter the parameters of the Tag you want to create.



The screenshot shows the 'Identification' form for creating a new tag. It has a light blue header with the title 'Identification'. Below the header, there are two main input fields: 'Tag Name' and 'Tag Description'. The 'Tag Name' field contains the text 'TAG01|' and has a blue border. To its right is a 'Page' dropdown menu currently set to 'Default'. The 'Tag Description' field contains the text 'My\_first\_TAG' and has a white border. The form is set against a light blue background.

- Enter a **Tag Name** – free text, no spaces, no symbols -, =, %, \$, @, # etc.
- Enter a **Description** – free text
- Select **DF1** or **ABLogix** as IO server depending on product family of the relevant PLC

**Identification**

Tag Name:  Page:  ▾

Tag Description:

---

**I/O Server Setup**

Server Name:  ▾ Topic Name:  ▾

Address:

Enter element number.  
Element number may be followed optionally with a Field selector, bit Selector and/or a PLC address

Type:  ▾  Force Read Only

eWON value = IO Server Value \*  +

- Select a **Topic Name** A, B or C. The topic must have been configured in the IO server page

The remaining fields are mostly left with their default value:

Type: DataType of the tag (Automatic, Floating Point, Boolean, Integer, Dword). All tags are stored on 4 bytes. The default Automatic option let the Flexy decide the format depending on the IOserver register/modifier type.

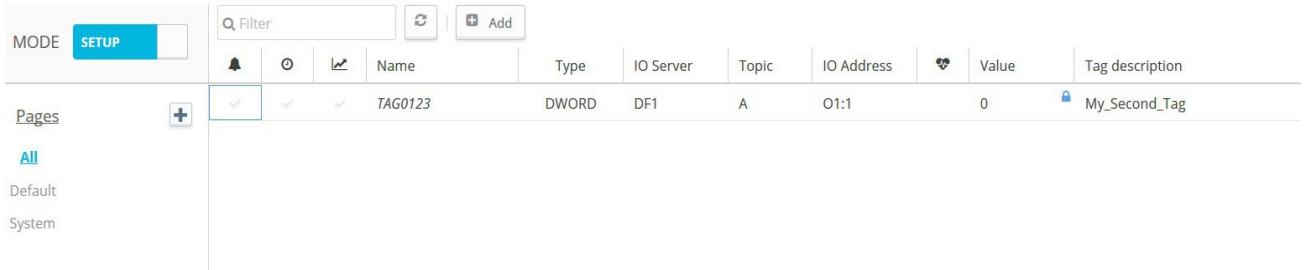
Force Read Only: Unchecked by the default. Once it is checked, users will not be able to write a value by using the Mode View.

The tag remains however read/write for commands written in the embedded BASIC program.

eWON value: Defaults are \*1+0. Applies a scale factor and an offset to the raw value coming from the IO server. The scale factor and offset are float values.

Negative values are accepted.  $TAGval = IOSEVERval * scale\ factor + offset$ .

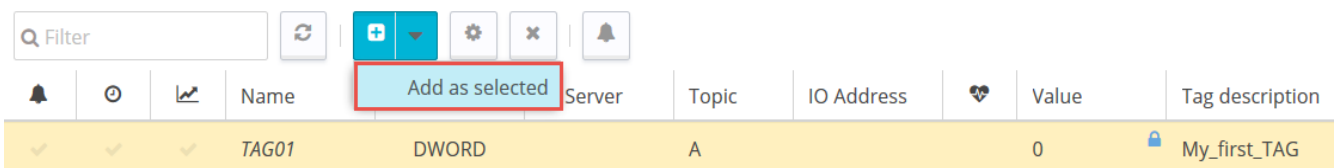
- Click on the Add tag only button when your tag configuration is completed.
- If everything is OK our new tag appears in the tag list



- If not, here below there are a couple of examples of error messages that can appear:

Error	Description
Tag name empty	The Tag name should be written, it is a mandatory field
Invalid character name	Check if the name contains invalid spaces and /or characters.
Invalid IO name for Tag	Check the Tag address syntax
Invalid topic name for Tag	Check if the topic field is A, B or C

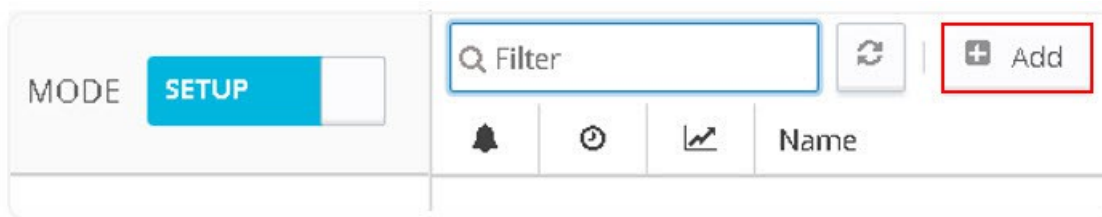
- If you need to create new tags with similar properties as an existing tag in the list, select the tag already created and then click on the arrow next to **Add (+)** and select **Add as selected**



- Using this option, all properties of the existing tag will be copied in the new tag creation window. Copied properties include the Tag Name. Since the Tag Name must be unique, make sure you change the name of the new tag.

## 8. Monitoring tags

- Switch to the View Mode page to check tag values and status
- You can change the value of tags that are configured as read/write. To change the tag value, double click on the value field or click on the Edit Value icon, enter the new value and click on Apply.
- It is also possible to change multiple Tags simultaneously and click on Apply



**- Note -**

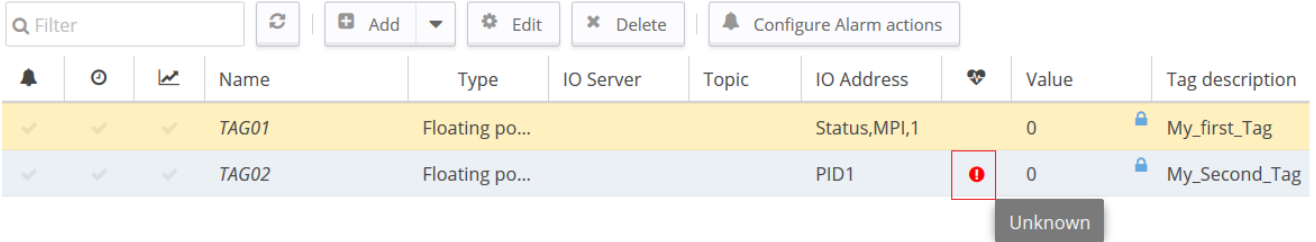
*Clicking on Update send the new value to the PLC register. This value will return in the next poll.*



## 9. Troubleshooting tags in error

A red icon displayed in the View Mode indicates that the quality of this tag value is not reliable.

Moreover a mouse over will present you a short description about the source of the problem as shown below.



Name	Type	IO Server	Topic	IO Address	Value	Tag description
TAG01	Floating po...			Status,MPI,1	0	My_first_Tag
TAG02	Floating po...			PID1	0	My_Second_Tag

Error	Description
No communication	This represents no communication between the eWON Flexy and the at PLC.
Disable	Check if the Topic used for this Tag is enable in the selected IO Server
Unknown	Frequently an issue in the IO server configuration
Device error	Likely wrong or non existing address in the PLC device

### - Note -

*A single tag in error (truly bad) can cause communication errors for other Tags if they are grouped in a single read request (especially when several tags are configured with successive Allen-Bradley addresses). Indeed, the Allen-Bradley device will simply respond that the whole request is invalid.*

- To identify what tag caused the issue, check the option 'Disable Tags in Error':



Do not forget to deactivate the option (and click "Init" link in IO Server menu) once the error have been resolved.

To get more details about the source of the errors and the sequence of events before and after they occurred, you can check the Event Logs shown on the left hand side menu under Diagnostic.



In case of communication error, check the cabling and dip switch settings (serial link).

## Appendix A - SLC500-Family tag address syntax

### Examples:

The syntax of the tag addresses is shown below

Item type	Address	Description
Integer File Items	N7:10	Integer N7:10
	N7:10/14	Bit 14 of Integer N7:10
Output File Items	O:1.0	Output 1, element 0
	O:1.0/5	Bit 5 of Output 1, element 0
Input File Items	I:1.0	Input 1, element 0
	I:1.0/5	Input 1, element 0, bit 5
Status File Items	S2:42	Seconds info of PLC
	S2:10/2	Forces enabled on PLC
Binary File Items	B3:5/1	Bit 1 of element 5
Timer File Items	T4:1.ACC	Accumulator of timer T4:1
	T4:1.PRE	Preset of of timer T4:1
Counter File Items	C5:2.ACC	Accumulator of counter C5:2
	C5:2.PRE	Preset of counter C5:2
Control File Items	C6:1.LEN	Len of control file C6:1
	C6:1.POS	POS of control file C6:1
Floating File Items	F8:5	Floating point F8:5

### Syntax of tag addresses

General tag address format as shown below

X[file]:element [.field][/bit]

Element	Description
X	Identifies the file type
File	File number, must be 0-255 decimal
Element	Element number within the file
Field	Used only for <b>Counter</b> , <b>Timer</b> and <b>Control</b> files
/bit	Valid for all types except <b>Floating</b>

X	File Type	Default File number	Field	Tag Format
O	Output	0		DWord
I	Input	1		DWord
S	Status	2		DWord
B	Binary	3		DWord
T	Timer	4	.PRE, .ACC, .EN, .TT, .DN	DWord
C	Counter	5	.PRE, .ACC, .CU, .CD, .DN, .OV, .UN, .UA	DWord
R	Control	6	.LEN, .POS, .EN, .DN, .ER, .UL, .IN, .FD	DWord
N	Integer	7		DWord
F	Floating	8		Floating point
A	ASCII	None		DWord

**- Note -**

*DWord = an unsigned 32 bits integer. Floating point = IEEE single precision float representation.*

## Appendix B - Control Logix-Family

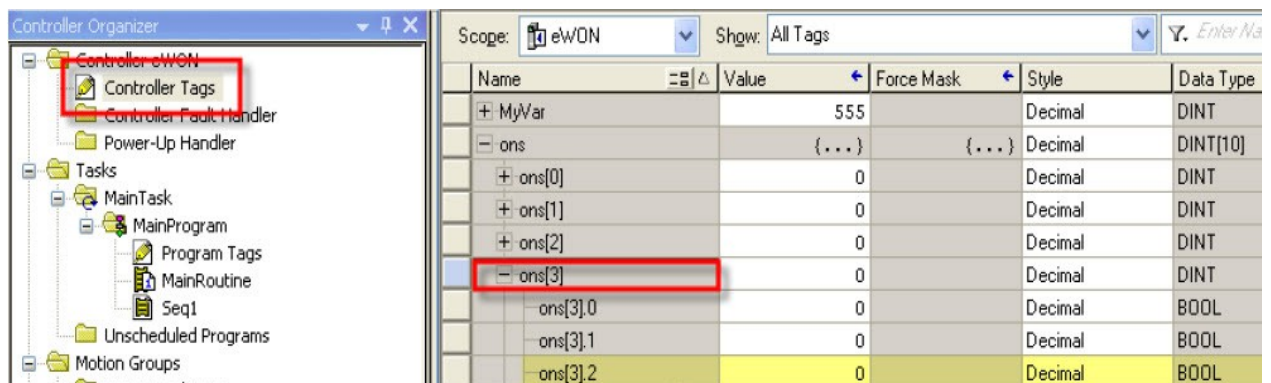
### Controller tags syntax of tag addresses

<SymbolicTagName>[/bit]

Tag name	Address	Description
Local:1:O	Local:1:O.Data	Local IO module 1:O
	Local:1:O.Data/2	Bit 2 of Local IO module 1:O
ons	ons[3]	3d element of INT Array
	ons[3]/2	Bit 2 of 3d element of INT Array <b>Note</b> .2 replaced by /2 while eWON does not support . before a number
TON	TON[0].PRE	Preset of Timer TON[0]
Myvar	Myvar	DINT

To read **Controller Tags** use the **Symbolic TagName** created inside the controller tag section of your PLC as shown below

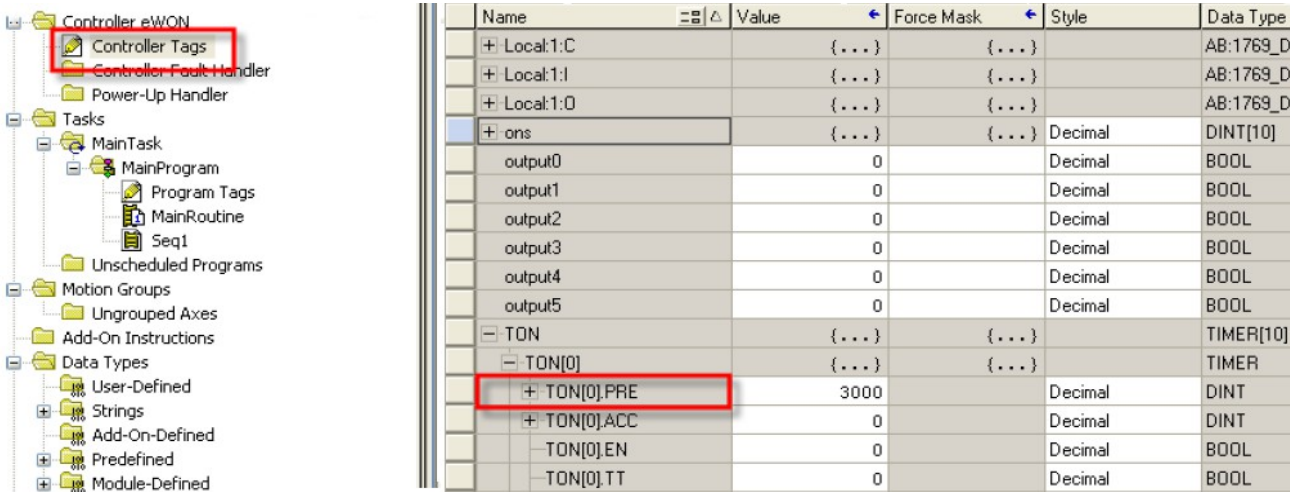
- To read an Array :



Name	Value	Force Mask	Style	Data Type
MyVar	555		Decimal	DINT
ons	{...}	{...}	Decimal	DINT[10]
ons[0]	0		Decimal	DINT
ons[1]	0		Decimal	DINT
ons[2]	0		Decimal	DINT
ons[3]	0		Decimal	DINT
ons[3].0	0		Decimal	BOOL
ons[3].1	0		Decimal	BOOL
ons[3].2	0		Decimal	BOOL

- To read Timer, Control or Counter :

<SymbolicTagName>.acc (or .ctl or .pre)



Name	Value	Force Mask	Style	Data Type
+ Local:1:C	{...}	{...}		AB:1769_D
+ Local:1:I	{...}	{...}		AB:1769_D
+ Local:1:O	{...}	{...}		AB:1769_D
+ ons	{...}	{...}	Decimal	DINT[10]
output0	0		Decimal	BOOL
output1	0		Decimal	BOOL
output2	0		Decimal	BOOL
output3	0		Decimal	BOOL
output4	0		Decimal	BOOL
output5	0		Decimal	BOOL
- TON	{...}	{...}		TIMER[10]
- TON[0]	{...}	{...}		TIMER
+ TON[0].PRE	3000		Decimal	DINT
+ TON[0].ACC	0		Decimal	DINT
- TON[0].EN	0		Decimal	BOOL
- TON[0].TT	0		Decimal	BOOL

### Program Tags

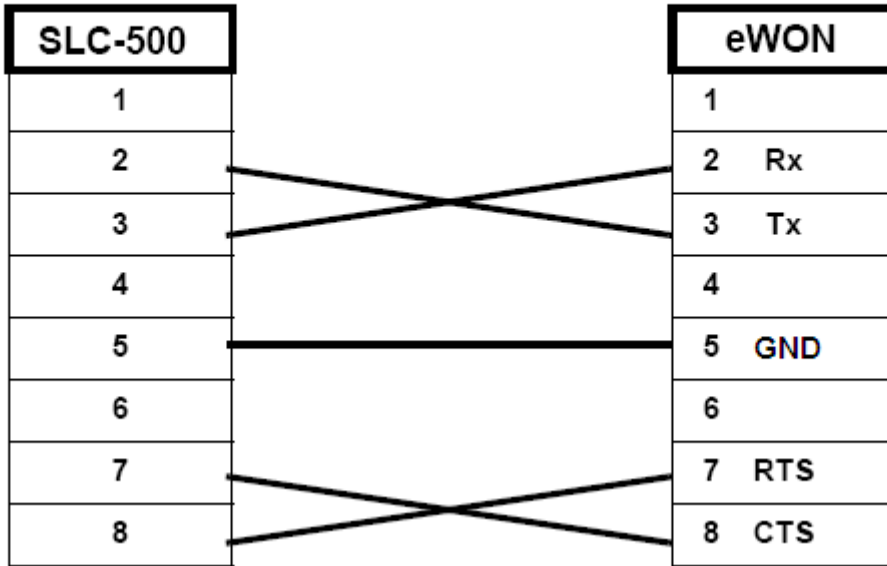
PROGRAM:ProgName.]SymbolicTagName

Tag name	Address	Description
Myvar2	PROGRAM:MainProgram.Myvar2	Tag Myvar2 inside MainProgram
	PROGRAM:MainProgram.Myvar2/4	Bit 4 of tag Myvar2 inside MainProgram
TON1	PROGRAM:MainProgram.TON1.PRE	Preset of Timer TON1 inside MainProgram

## Appendix C - Serial DF1 cable pinout

The cable that can be used is the standard Allen-Bradley serial cable (reference 1747-CP3).

### 1747-CP3 cable between eWON and SLC-500 - pinout





## Revision

### Revision History

Revision Level	Date	Description
1.0	15/01/2018	Original Document

#### Document build number: 3

#### Note concerning the warranty and the rights of ownership:

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